OMPS Limb Profiler L2 Products

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Operational Products

- O_3 Vertical Profile (cloud-top to 60 km)
  - V2 algorithm released in mid 2014
  - Number density vs alt profiles are primary. Mixing Ratio vs p produced using assimilated GPH and temp data from NASA GMAO (MERRA)
  - No explicit aerosol correction
  - Central slit data are best
- Cloud-top Height
  - New product
- Aerosol Extinction Profile
  - V0.5 algorithm ready, data are currently reprocessed
- Pressure/temperature profile (40-70 km)
  - Under development

LP Altitude Registration Methods

- 350 nm radiance ratio method (aka RSAS)
  - @350 nm I(32 km)/I(20 km) varies by ~12%/km
  - Not affected by instrument drift or diffuse upwelling radiation, but affected by aerosols.
  - Works best in the S. polar region.
- 305 nm/60 km radiance method
  - Less accurate than RSAS but works at all latitudes

Absolute Accuracy: ±200m
Relative Accuracy: ±100m
Precision: ~50m

Key Results

Tangent height error (km)

(after slit edge correction)

	Left Slit	Center Slit	Right Slit
Low Gain	1.4	1.6	1.7
High Gain	1.2	1.4	1.5

Central slit: 1 km ≡1 arc-min pitch error
Left/right-central slit: 80 m ≡1 arc-min roll error

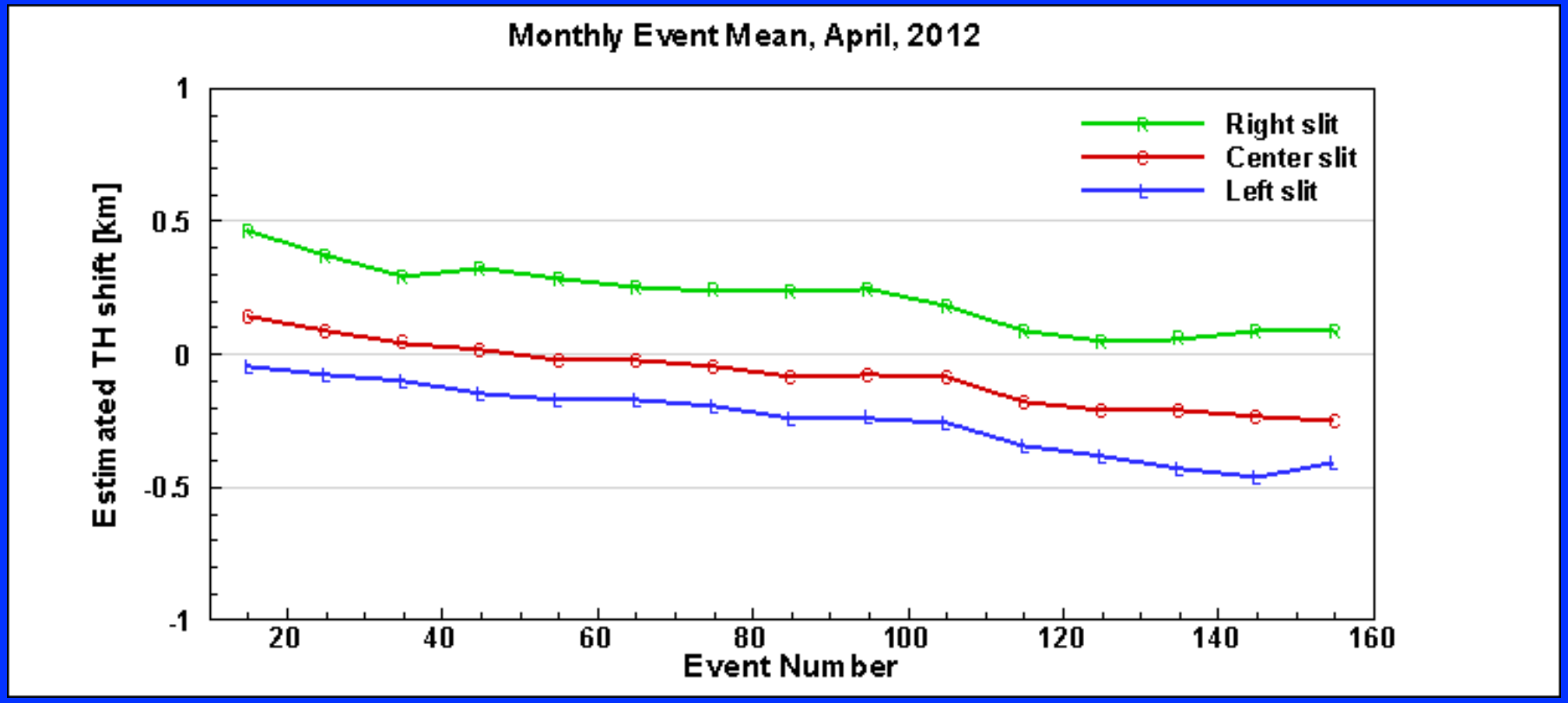
Time dependence : 100 m shift on April 28, 2013

- occurred when both star trackers were used for the first time indicating 12 arc-sec pitch bias between them.

Lat dependence: ~300 m variation (after slit edge correction)

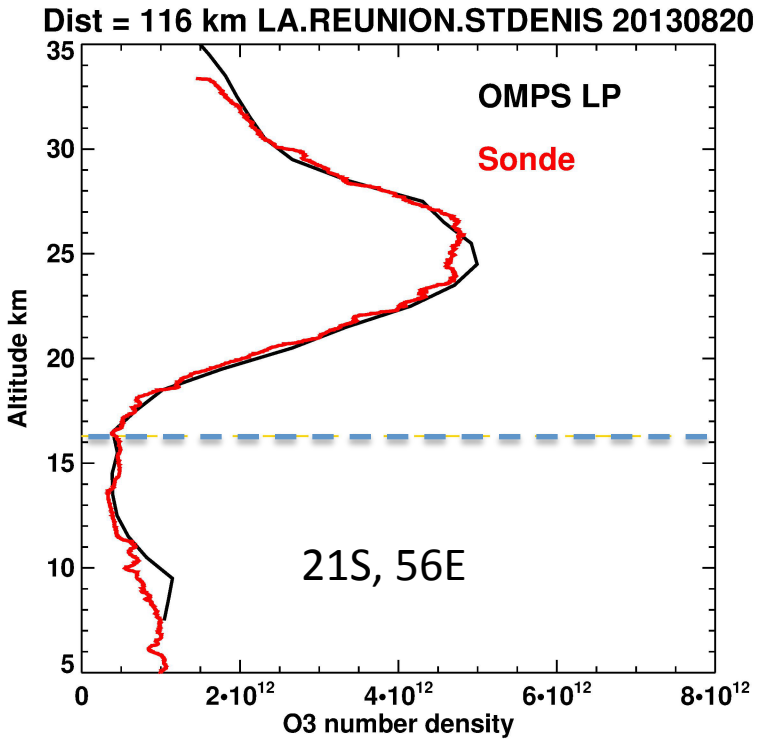
Along-orbit variations in altitude error

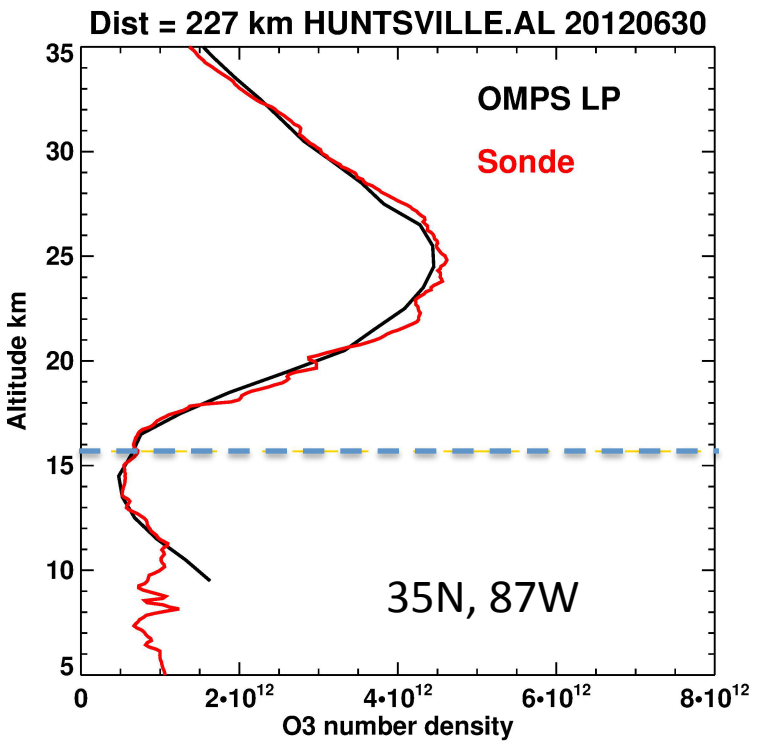
Shows the corrections that need to be applied to the V2 high gain data, which were adjusted by -1.65 km based on preliminary RSAS results



Event numbers are counted from the southern to northern terminator. They are 1.1˚ apart in latitude, except in the polar regions.

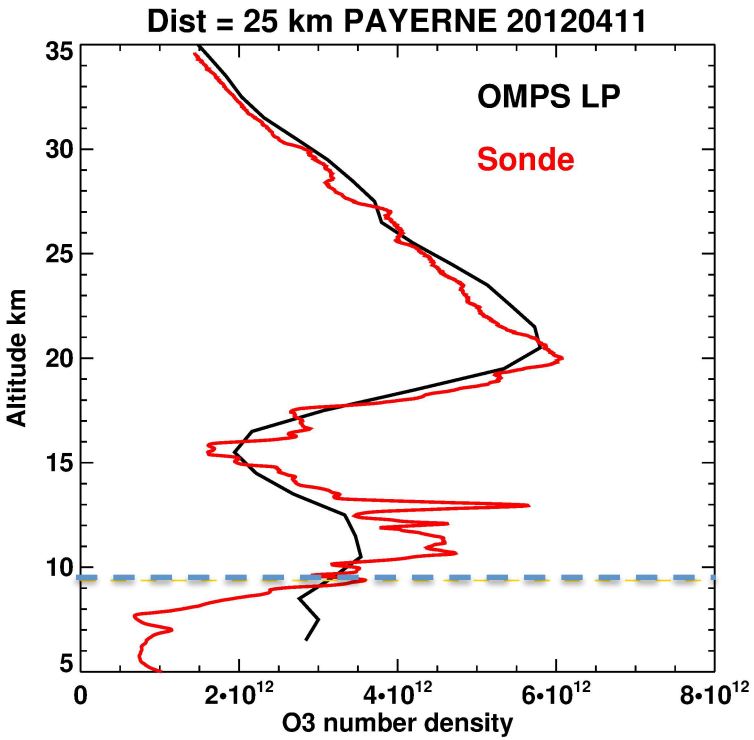
Comparison with High Trop Ozonesondes

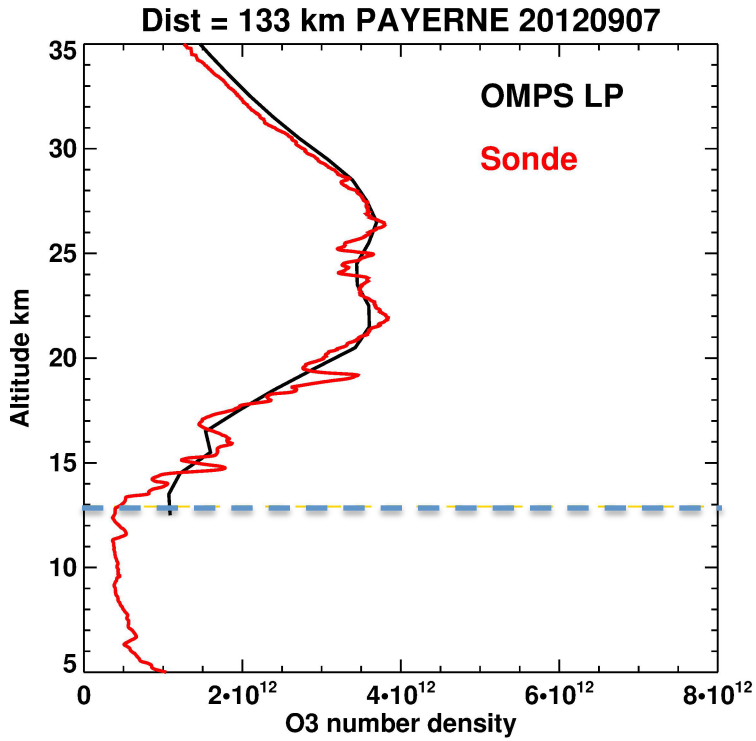




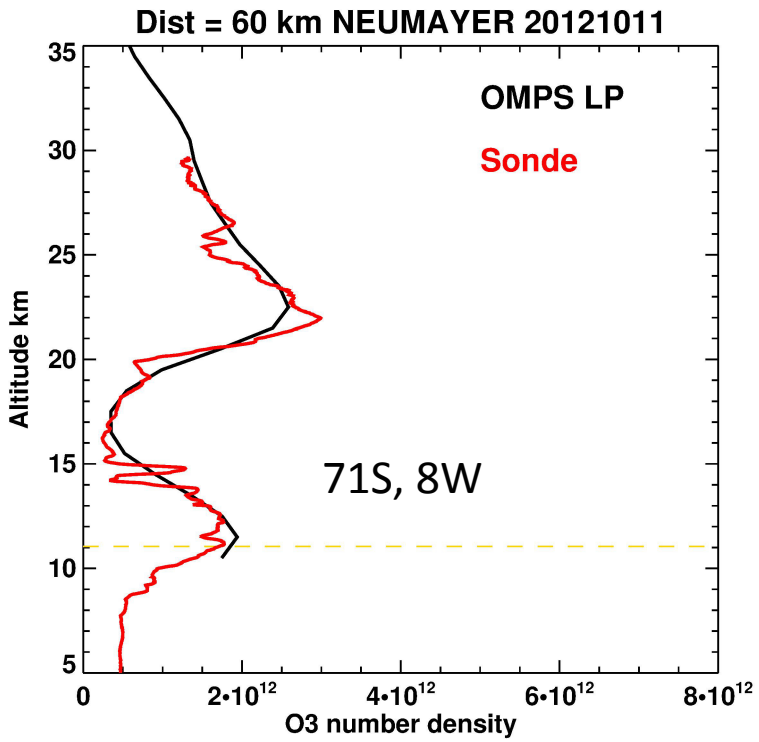
LP has ~ 1.8 km vertical and ~200 km horizontal res

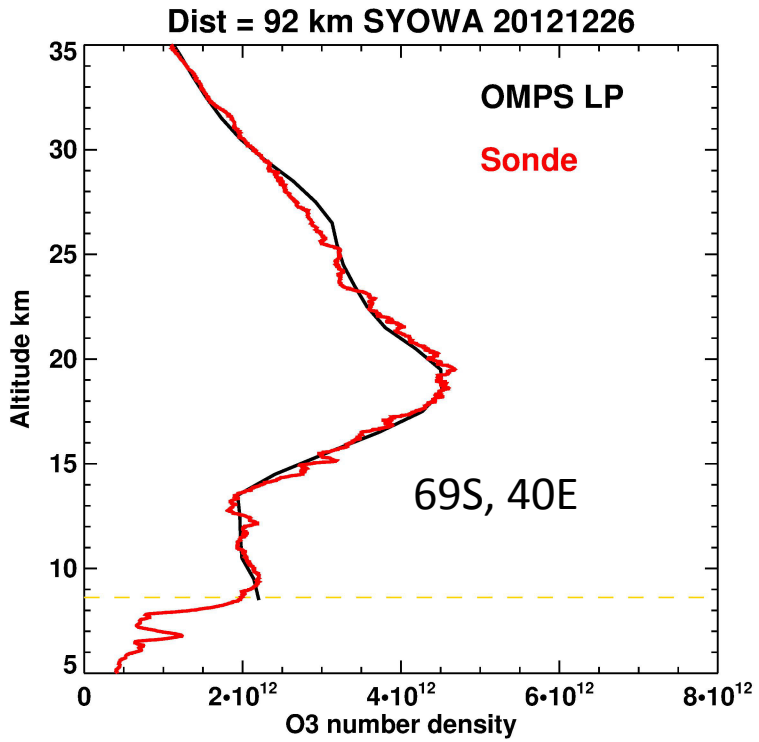
Comparison with Payerne (47N, 7E) Ozonesondes



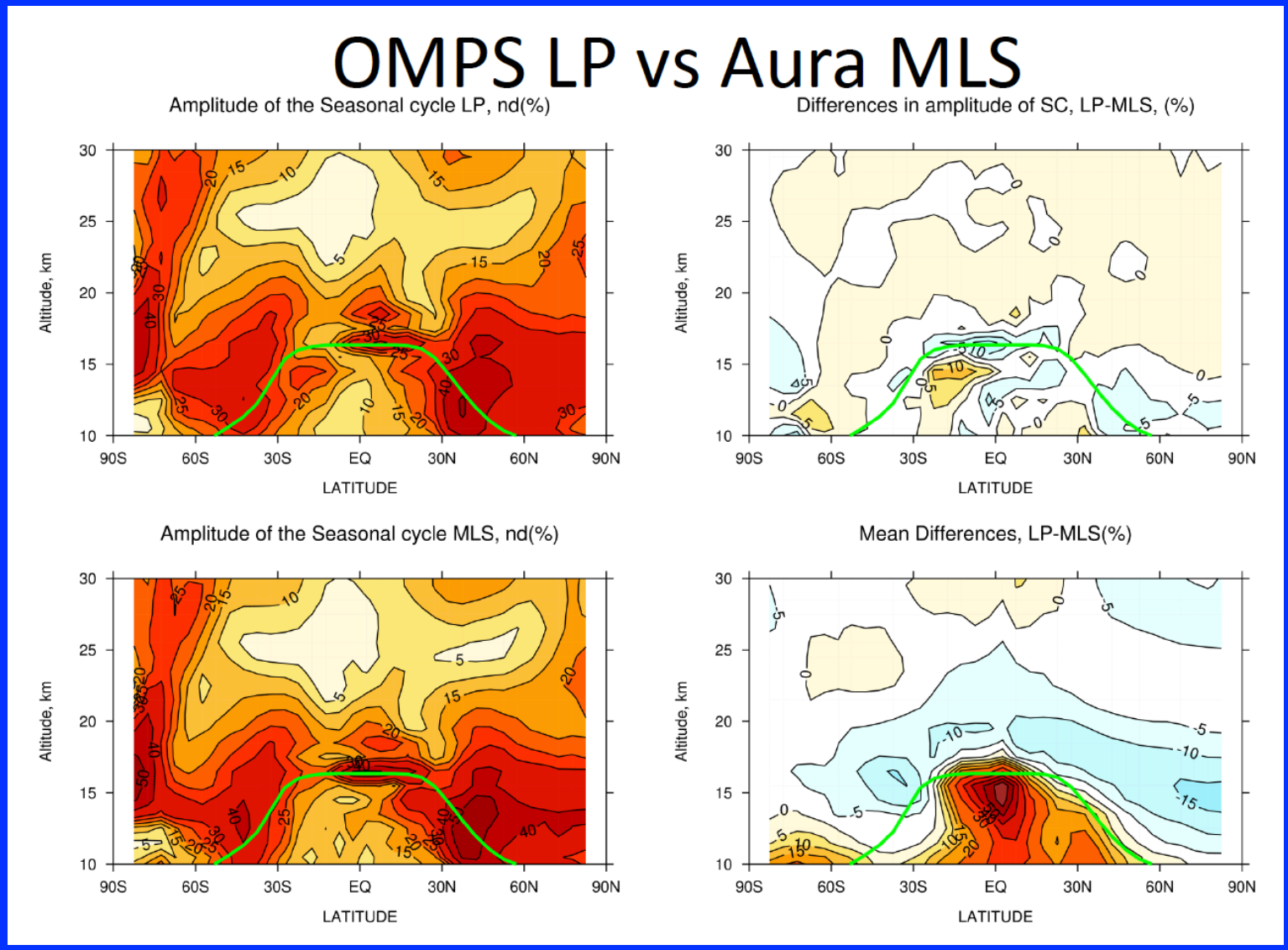


Comparison with Antarctic Ozonesondes



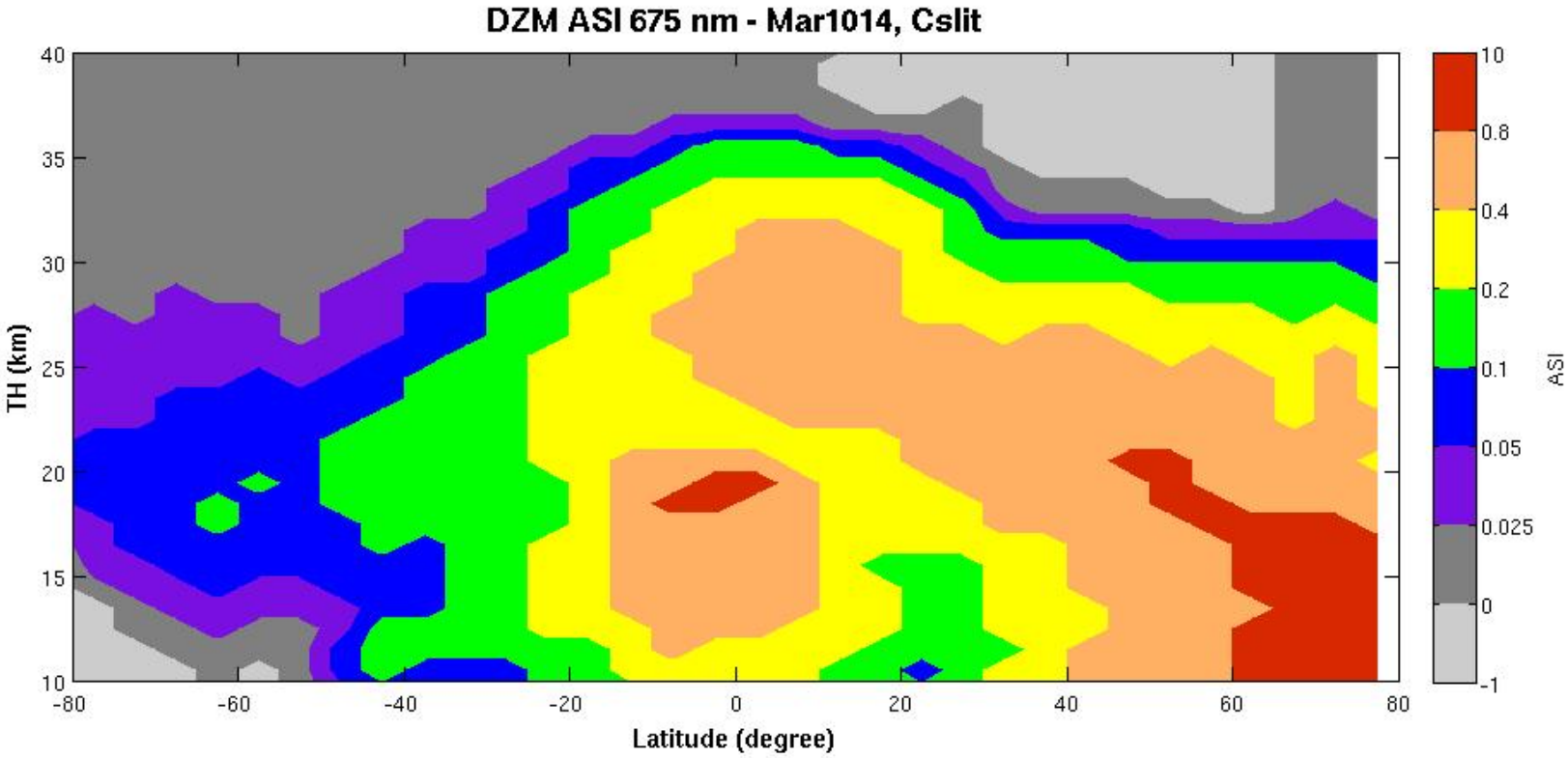


Summary of MLS comparison



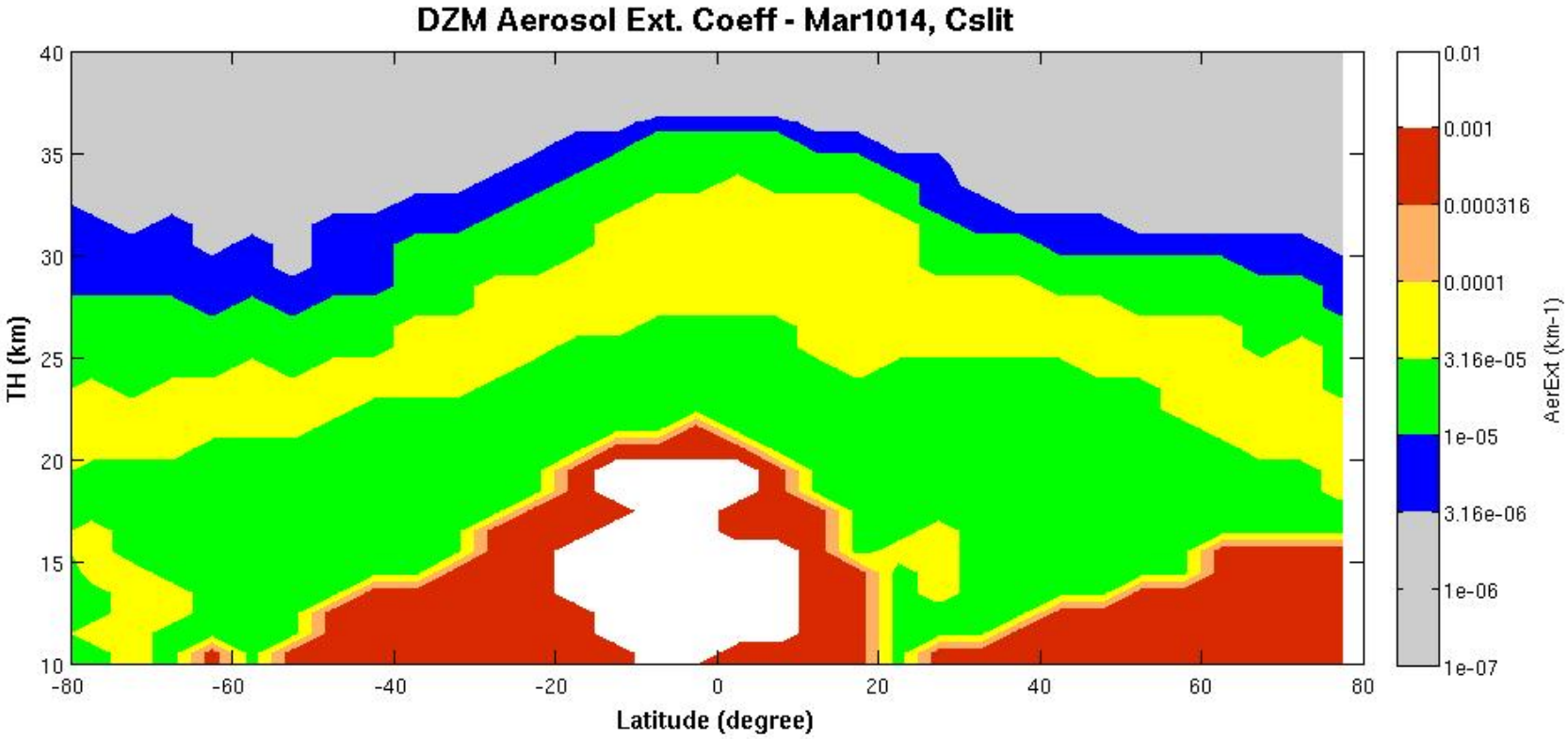
Aerosol Scattering Index (ASI)

$$ASI = (I_m - I_R)/I_R \leq I_a/I_R$$



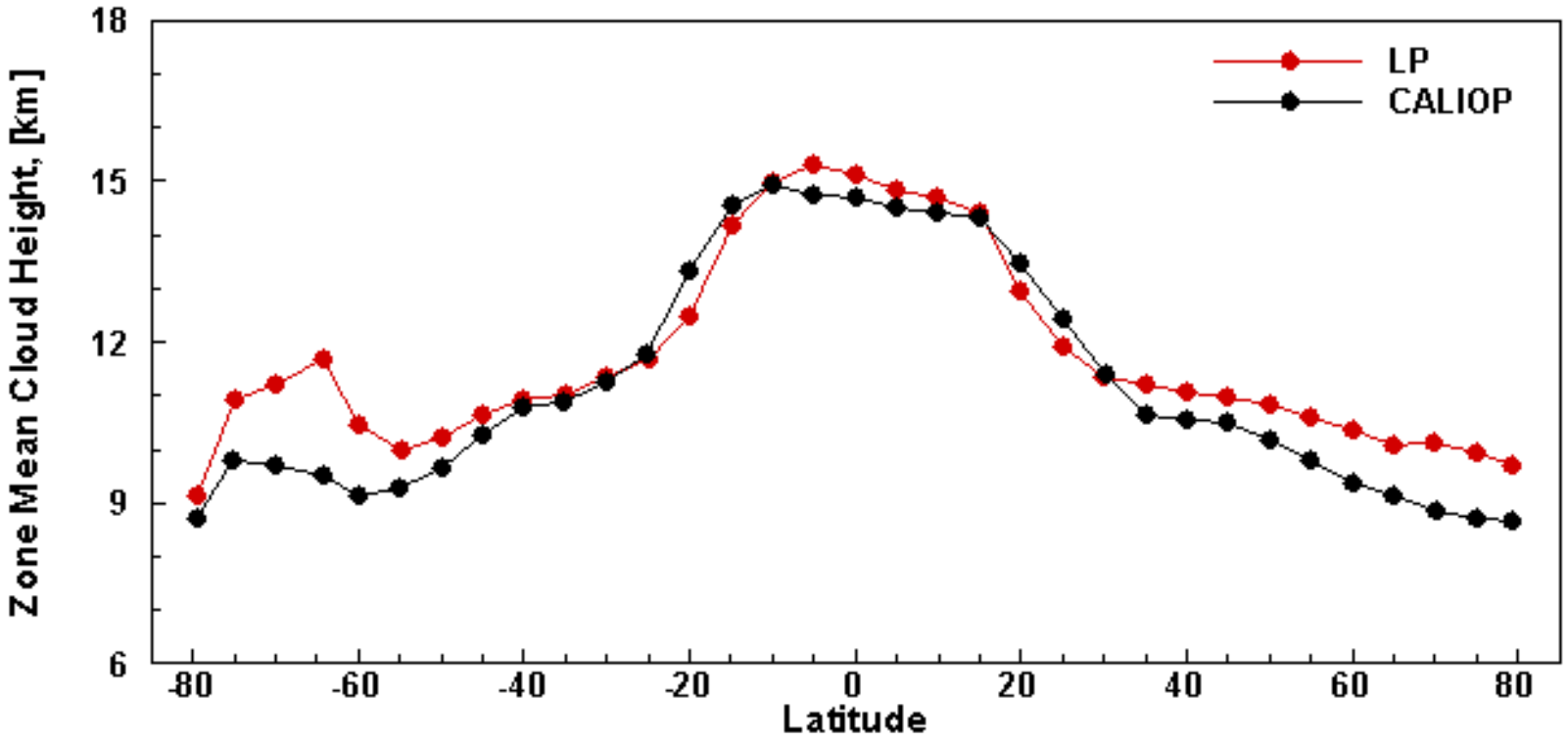
- N/S bias is caused by difference in scattering angle
- Produces >10 times variation in ASI for same aerosol extinction

Retrieved Aerosol Extinction



- Retrieved extinctions are approx hemispherically symmetric

Cloud-top Height



Cloud index (CI)

$$CI = \frac{d \ln I(\lambda_1, z)}{dz} - \frac{d \ln I(\lambda_2, z)}{dz} \quad \lambda_1 = 674 \text{ nm}, \lambda_2 = 868$$

CI > 0.15 is defined as clouds

Summary

- V2 Ozone algorithm is about a year old
  - TH and aerosols are the primary error sources
  - TH errors are reasonably well known. Correction can be easily applied to the processed data. Aerosol correction is under investigation.
- V0.5 Aerosol product will be available soon
- Cloud-top height dataset is available
- An algorithm to estimate 40-70 km pressure profile is being developed.